COMPUTER TEACHER COURSE BOOK

PRECOMPUTER 2000®

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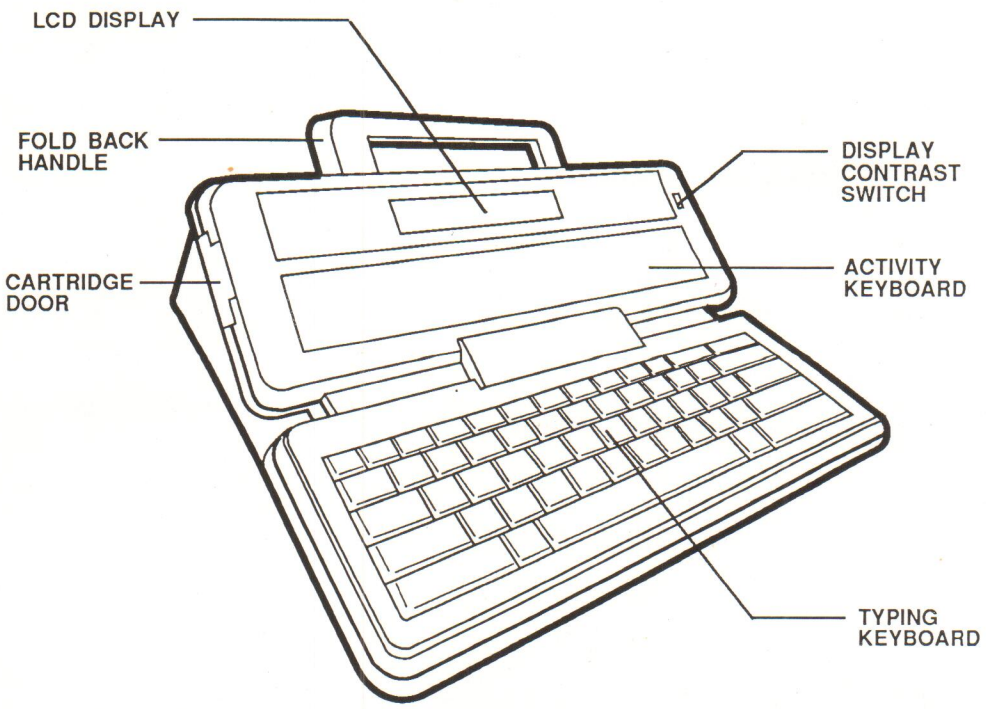
CHAPTER 1 Introduction

PRECOMPUTER 2000 is the top of the line electronic learning aid. As a step-up from the popular **PreComputer 1000**, this new expanded 2000 model features an easy-to-read two line dot matrix LCD display and a standard-sized keyboard that introduces the user to the look and feel of a real computer. With 33 built-in activities and functions, **PRECOMPUTER 2000** offers a wide range of educational activities and functions, such as a calculator and spell checker, BASIC, vocabulary, grammar, mathematics, challenging trivia and more!

PRECOMPUTER 2000 is expandable with additional ROM cartridges covering a variety of subjects. **PRECOMPUTER 2000** is compatible with most of **PreComputer 1000** cartridges as well.

Note: The **PreComputer 1000 Speller** (80-1004) is not compatible with the **PRECOMPUTER 2000**.

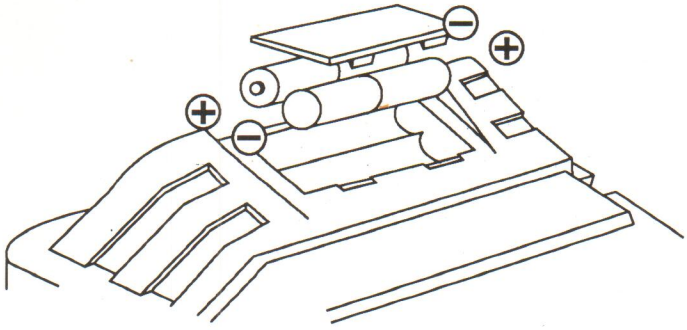


CHAPTER 2 Power Supply

PRECOMPUTER 2000 is portable and will operate with either an AC adaptor or batteries (not included). We recommend the use of alkaline batteries for optimum performance. For best results, use only new batteries.

BATTERY INSTALLATION:

1) Make sure the unit is turned OFF.
2) Open the battery cover on the bottom of the unit.
3) Insert 4 "C" (UM2 or LR14) batteries into the battery compartment as shown in the diagram below.
4) Close the battery compartment and turn the unit ON.



WHEN USING AN ADAPTOR:

Use a 9 volt, 300mA +-●)-- center positive AC adaptor.

1) Make sure the unit is turned OFF.
2) Plug the adaptor into the unit's jack.
3) Plug the adaptor into the wall outlet.
4) Turn the unit ON.

The VTECH 9 volt AC adaptor (model 80-0877) will operate your product. Many retailers carry the adaptor, however, if you are unable to locate one locally, send US $10.00 (including shipping and handling) (Illinois residents please add 7% sales tax) to:

Adaptor c/o
VIDEO TECHNOLOGY INDUSTRIES, INC.,
380 West Palatine Rd.
Wheeling, IL60090-5831

Note: Do not leave adaptor plugged in for long periods of time when not using the **PRECOMPUTER 2000**.

DISPLAY CONTRAST SWITCH:

PRECOMPUTER 2000 has a high and low contrast switch to adjust to different lighting conditions. Switch to the alternate position if you have difficulty seeing the characters on the LCD screen.

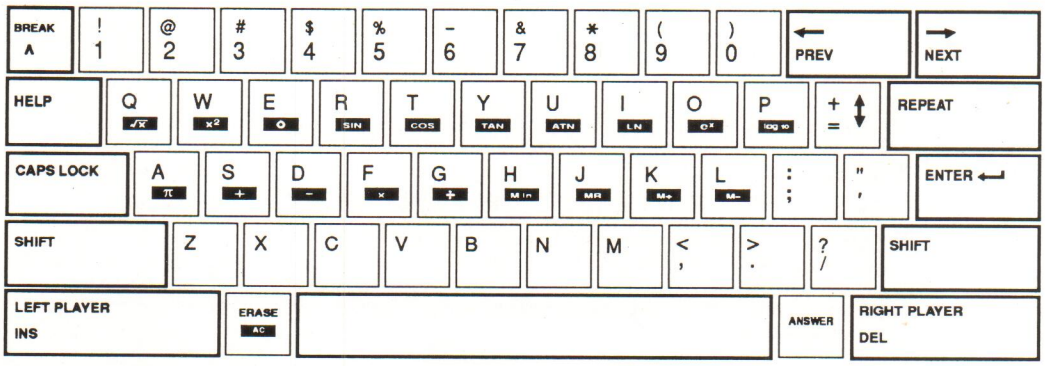
AUTO POWER OFF FUNCTION:

PRECOMPUTER 2000 will turn itself off automatically if there is no input for approximately 15 minutes.

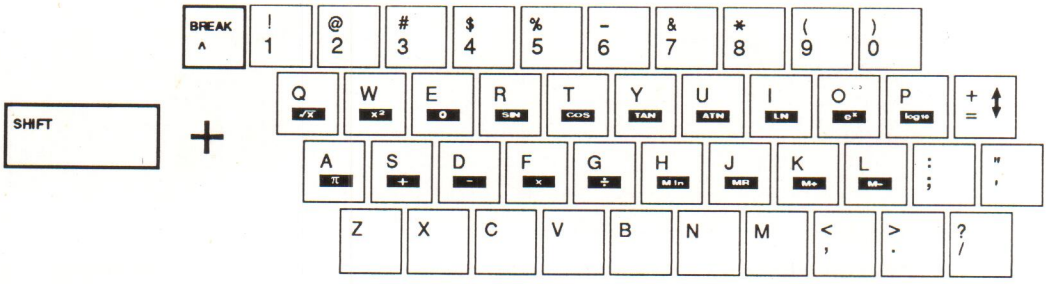
CHAPTER 3 Operating PreComputer 2000

THE TYPING KEYBOARD:

The keyboard on **PRECOMPUTER 2000** combines the operation of standard computer keyboards with several special functions.



The keys resemble and function like the keys on a typewriter. The letters and numbers are in the same positions. Capital letters and the symbols above the numbers are made by holding the **SHIFT** key down while pressing the appropriate key.



ENTER KEY: ENTER ↵

Press the **ENTER** key after you have typed in an answer to a question. The **PRECOMPUTER 2000** will then determine whether your response is correct or not.

SHIFT KEY: SHIFT

The **SHIFT** key enables you to type capital letters on the **PRECOMPUTER 2000**'s keyboard. Also, the **SHIFT** key will generate whatever symbol appears on the top half of keys with two items. For example: if you press the **SHIFT** key and the 4 key, the $ symbol will appear on the screen.

CAPS LOCK KEY: CAPS LOCK

This key function allows you to generate a continuous series of capital letters without having to press the **SHIFT** key each time. Press once to activate the **CAPS LOCK** key; press again to release it.

SPACE BAR KEY:

Press the Space Bar to insert one space between words or numbers in games or activities where you must type sentences or phrases. Each time you press the Space Bar, another space will be added.

RIGHT PLAYER/LEFT PLAYER KEYS: LEFT PLAYER INS | RIGHT PLAYER DEL

These two keys on the lower right and left corners of the keyboard determine which player will answer when operating in two-player mode. For activities in two-player mode, the left player's name and the right player's name will flash alternately. The first player to press his or her appropriate **LEFT** or **RIGHT PLAYER** button will get the opportunity to answer the question.

CURSOR KEYS: ← PREV | → NEXT

Press the Cursor key with the arrow pointing → NEXT to move the cursor position to the right and press the cursor key pointing ← PREV to move the cursor position to the left. The short blinking line on the screen, the cursor, indicates where the next letter will appear. On the **PRECOMPUTER 2000**, these Cursor keys also allow you to scroll left or right on the visible screen so that you can make corrections to words you've already typed.

You can also use these two keys to control the scrolling speed of questions in the **TRIVIA** activities and **MATH RIDDLES**. Pressing the ← PREV key makes the scrolling faster and pressing the → NEXT key makes the scrolling slower.

HELP KEY: [HELP]

If you need a hint when answering a question, press the **HELP** key and the first letter of the word will appear in some activities. When you press the **HELP** key in the **TRIVIA** activities and **MATH RIDDLES**, three multiple choice answers will appear for you to choose from.

Note: The **HELP** key does not function in the two-player mode.

BREAK KEY: [BREAK ^]

Press **SHIFT** and **BREAK** keys when you want to interrupt a BASIC program when it is running.

REPEAT KEY: [REPEAT]

Press this key when you wish to repeat a question.

ANSWER KEY: [ANSWER]

Press this key to find the correct answer to a question.

ERASE/AC KEY: [ERASE / AC]

Press this key to change an entry prior to pressing the **ENTER** key. The **AC** key is used to cancel all numbers in the calculator mode.

VERTICAL CURSOR / + / = KEY: [+ / =]

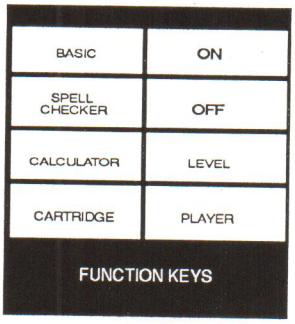
Use this key in activities where you need to move letters vertically between two lines. For example: in **ALPHAJUMBLE** and **LETTER SWITCH**. The **+/=** are used in the **PRECOMPUTER 2000**'s calculator function.

THE ACTIVITY SELECTOR:

The activity selector is a membrane keyboard which allows you to access the functions and activities easily with just a touch.

SCRAMBLE	LETTER ZAPPER	PLURALS	BASIC MATH	ECOLOGY	TYPING GAME	BASIC	ON
GUESSWORK	LETTER SWITCH	PAST TENSE	ADVANCED MATH	HISTORY	ALPHAJUMBLE	SPELL CHECKER	OFF
MISSING LETTER	SENTENCE JUMBLE	SYNONYMS	MATH RIDDLES	GEOGRAPHY	WORD FLASH	CALCULATOR	LEVEL
LETTER HUNT	GRAMMAR CHALLENGE	ANTONYMS	NUMBER CHALLENGE	SUPER POWER	SIGN SEARCH	CARTRIDGE	PLAYER
WORD GAMES			MATH	TRIVIA	GAMES	FUNCTION KEYS	

THE FUNCTION KEYS



ON KEY:

Press the **ON** key to turn the unit on.

OFF KEY:

Press the **OFF** key to turn the unit off.

LEVEL KEY:

PRECOMPUTER 2000 provides 4 levels of challenge in all activities. Press the LEVEL key to determine the level of difficulty for the various games and activities. Press the appropriate number on the keyboard to begin play at the desired level.

In the **WORD GAMES** activities, the words in Level 3 and Level 4 are all SAT words.

PLAYER KEY:

Press the **PLAYER** key to change from one player mode to two player mode and vice versa. If you press the **PLAYER** key during a game it will reset and begin again.

BASIC KEY:

This key enables you to access the BASIC program within the **PRECOMPUTER 2000**.

SPELL CHECKER KEY:

Press the **SPELL CHECKER** key, then type in a word and the **PRECOMPUTER 2000** will verify if it is spelled correctly or not. If the word is misspelled, use the Left and Right arrow keys to "scroll" down a list of possible choices for the correct word.

CALCULATOR KEY:

Press this key to transform the unit into a functional calculator.

CARTRIDGE KEY:

Press this key when you have inserted a **PRECOMPUTER 2000** compatible cartridge to make use of the activities on that cartridge. (Note: Cartridges are sold separately.)

THE ACTIVITY KEYS:

There are 30 activities in **PRECOMPUTER 2000**. Most of them can be accessed with just a touch of the Activity Selector.

SCRAMBLE	LETTER ZAPPER	PLURALS	BASIC MATH	ECOLOGY	TYPING GAME
GUESSWORK	LETTER SWITCH	PAST TENSE	ADVANCED MATH	HISTORY	ALPHAJUMBLE
MISSING LETTER	SENTENCE JUMBLE	SYNONYMS	MATH RIDDLES	GEOGRAPHY	WORD FLASH
LETTER HUNT	GRAMMAR CHALLENGE	ANTONYMS	NUMBER CHALLENGE	SUPER POWER	SIGN SEARCH
WORD GAMES			MATH	TRIVIA	GAMES

HOW TO PLAY:

To begin an activity or game, press the **ON** key to turn on the unit. Choose an activity and press its key on the **PRECOMPUTER 2000**'s Activity Selector. Activities automatically begin in Level 1 in the one player made.

TWO PLAYER MODE:

For two player mode, first press the **PLAYER** key, enter the number 2, "R. PLAYER NAME:" will appear on the top row of the screen. Type in the name of the person who will operate the **RIGHT PLAYER** key and press **ENTER**. Follow the same procedure for the **LEFT PLAYER** key. In two player mode, the right and left player's names will flash back and forth on the screen. The player who presses his/her player button first will have the chance to answer the question.

The level of play and player mode will remain the same from one activity to another unless you change the setting.

SCORING:

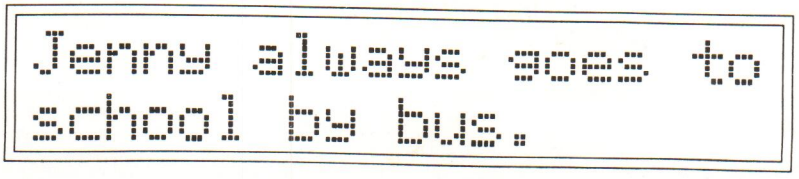
In one player mode for most activities there will be five questions in one round. You will receive 20 points for a correct answer on the first try and 10 points on the second try. 5 points will be deducted if you use the **HELP** key. No points will be awarded if you do not answer correctly by the second try or if you press the **ANSWER** key.

In two player mode, both players begin with scores of 100 in most of activities and one round will consist of ten questions. 10 points will be added to your score for each correct answer and 10 points will be deducted for each incorrect answer.

Note: There is no two player mode in **NUMBER CHALLENGE**, **TYPING GAME** and **ALPHAJUMBLE**.

THE DISPLAY:

PRECOMPUTER 2000 features a big dot matrix liquid crystal display (LCD). It can display 2 lines x 20 characters on screen.



CHAPTER 4 Activities and Games

WORD GAMES

SCRAMBLE

Try to rearrange a series of scrambled letters into an actual word. A group of letters on the upper row will appear on the viewing screen. Type these jumbled letters on the bottom row, create the correct word and press **ENTER**.

GUESSWORK

Keep guessing the letters of the alphabet until you discover the mystery word. But guess well because you only have ten chances to pick the correct letters.

The series of dashes that appear on the bottom row of the screen represent the number of letters in the word. The # symbols on the top row represent the number of chances you have remaining to guess the correct letters. Each incorrect letter you guess will appear on the top row. Each letter you guess correctly will appear in the appropriate place in the word on the bottom row.

MISSING LETTER

Insert the missing letter to complete the word. A word will appear on the screen with one letter missing. Type in the correct letter that will complete the word and press **ENTER**.

LETTER HUNT

Spot the right place in the word to insert the given letter. A group of letters will appear on the top row of the screen along with a single letter on the far right top row margin. On the bottom row will be an arrow which you can move left or right by means of the ← PREV or → NEXT cursor keys. Position the arrow between the letters on the top row where you think the single letter should be inserted to form a correct word, then press **ENTER**.

LETTER ZAPPER

Take aim and shoot out the letter that doesn't belong in the word. A word with one extra letter in it will appear on the top row of the viewing screen. On the bottom will be a vertical arrow. Position the arrow, using the ← PREV or → NEXT cursor keys, under the letter that doesn't belong in the word and press the **ENTER** key to shoot it off the screen.

LETTER SWITCH

Exchange two letters to make a pair of words correct. Two words with the same number of letters will appear on the viewing screen, one word on the top row and one on the bottom. However, to make both words correct you must switch one letter from the top word with one letter from the bottom word. To do this, position the cursor, which will appear between the two words, at the letters you think should be switched, then press the **ENTER** key.

SENTENCE JUMBLE

Put the meaningless jumble of words in the right sequence to form a correct sentence. A group of words in random order will appear on the viewing screen. Decide how to arrange the words into a correct sentence by positioning the cursor to the first letter of each word. Find what you think should be the first word of the sentence and move the cursor to the first letter of that word, then press the **ENTER** key. That word will appear on the bottom row of the viewing screen. Repeat the process until you have formed a complete and correct sentence, then press the **ENTER** key.

GRAMMAR CHALLENGE

Spot the incorrect word and amend it to form a grammatically correct sentence. A sentence will appear on the screen with one word containing a grammatical error. Find the incorrect word by pressing the PREV and NEXT key until it stops at the first letter of that word, then press the **ENTER** key. If you are right, 3 words will appear on the screen. Choose the word that would make the sentence grammatically correct and press the corresponding number.

PLURALS

A singular form of a noun will appear on the top row of the viewing screen. Type in the plural of that word and press the **ENTER** key. The number of letters contained in the correct answer is indicated by the short dashes below the bottom row on the viewing screen.

PAST TENSE

Using your knowledge of verb forms, provide the past tense for verbs shown in the present tense. A verb in the present tense will appear on the top row of the viewing screen. Type in the past tense of that verb and press the **ENTER** key. The number of letters contained in the correct answer is indicated by the short dashes below the bottom row of the viewing screen.

SYNONYMS

Provide a word which has a similar meaning to The **PRECOMPUTER 2000**'s reference word. A word will appear on the top row of the viewing screen. Type in a word which has the same meaning and press the **ENTER** key. The number of letters of the correct synonym is indicated by the short dashes on the bottom row on the viewing screen. One letter in the correct word is given as a clue.

ANTONYMS

Provide a word with the opposite meaning to the **PRECOMPUTER 2000**'s reference word. A word will appear on the top row of the viewing screen. Type in a word which has the opposite meaning and press the **ENTER** key. The number of letters of the correct antonym is indicated by the short dashes on the bottom row of the viewing screen.

MATH

BASIC MATH

After pressing the **BASIC MATH** key, choose one of the 4 activities listed below by typing in the corresponding number on the keyboard.

1. Addition: A mathematics problem will appear on the viewing screen. Type in the correct answer using the number keys and press **ENTER**.

2. Subtraction: A mathematics problem will appear on the viewing screen. Type in the correct answer using the number keys and press **ENTER**.

3. Multiplication: A mathematics problem will appear on the viewing screen. Type in the correct answer using the number keys and press **ENTER**.

4. Division: A mathematics problem will appear on the viewing screen. Type in the correct answer using the number keys and press **ENTER**.

ADVANCED MATH

After pressing the **ADVANCED MATH** key, choose one of the 4 activities listed below by typing the corresponding number on the keyboard.

1. Fractions/ Decimals: A fraction appears on the screen. Type the same value in a decimal format and press **ENTER**.

2. Fractions/ Percentages: A fraction appears on the screen. Type the same value in by means of percentage and press **ENTER**.

3. Algebra: An algebraic equation appears on the screen. Type in the answer using the number keys and press **ENTER**.

4. Ratios: Two fractions of the same value appear on screen with one nominator or denominator missing in one fraction. Type in the correct number to make complete the fraction and press **ENTER**.

MATH RIDDLES

In this activity the **PRECOMPUTER 2000** challenges you to find the answers to math problems that are presented as story problems as opposed to numerical equations. Read each question that appears on the viewing screen and type in the answer on the keyboard. Then press the **ENTER** key.

NUMBER CHALLENGE

Test your memory skills as an increasing series of numbers appear on the screen. One single digit number will appear briefly in the far left top row on the viewing screen. Key in that number and press the **ENTER** key. Following that, another single digit will appear next to the first number. This time type in the two numbers and press the **ENTER** key. Continue the process as long as you can as the string of numbers increases. Your score in **NUMBER CHALLENGE** will be based on the total number of digits you correctly remember and key in.

TRIVIA

The Trivia activities of the **PRECOMPUTER 2000** include topics on **ECOLOGY**, **HISTORY** and **GEOGRAPHY**. There is also an activity called **SUPER POWER** which covers questions on a broad range of topics.

Select the **TRIVIA** topic you want by pressing the corresponding key. Read each question as it scrolls across the viewing screen and type in the correct answer. Then press the **ENTER** key.

Press the **HELP** key to select from three multiple choices if you have difficulty in answering the questions. 5 points will be deducted when you use the **HELP** function.

GAMES

TYPING GAME

Test your speed and accuracy as you type in the letters that scroll across the screen. Four chances are given. In this one player only activity a series of letters or words will scroll across the bottom row of the screen. Type the letters as they appear on the screen to score points. One chance will be deducted when the letters touch the left border of the screen. One chance will be added for every 1000 points scored. If you obtain the highest score in the record of **PRECOMPUTER 2000,** type in your name, which will be shown when you enter the activity.

ALPHAJUMBLE

Use the cursor keys to put a series of scrambled letters into alphabetical order. Two rows of scrambled letters will appear on the screen with one open space to allow for letter position shifting. Use the left/right cursor keys as well as the vertical cursor key to shift letters back and forth to put the entire series of letters into proper alphabetical order. No score is given for **ALPHAJUMBLE**.

WORD FLASH

Learn the spelling of new words as they appear on the screen. A word will flash three times on the top row of the screen then disappear. Type the word on the bottom row and press the **ENTER** key.

SIGN SEARCH

Find the appropriate sign from the horizontal scrolling list to correctly complete the mathematical equation. A mathematical equation with one symbol missing will appear on the bottom row of the screen with a continuing series of > = symbols in Level 1, < > = symbols in Level 2 and + – x ÷ symbols in Level 3 and 4 scrolling horizontally above. When the proper symbol from the top row reaches the position to correctly complete the equation on the bottom, press the **ENTER** key and the symbol will fall into place.

CHAPTER 5 BASIC

INTRODUCTION

ARE COMPUTERS IMPORTANT?

Computers are all around us. Like cars, phones and TVs, computers help us make our lives easier. Millions of computers are used everyday. Doctors use computers to treat patients. Police use computers to track criminals. Stores use computers to add up prices quickly. Scientists use computers for research. Banks use them to keep track of our money. Jets need computers to fly. Airports use computers to know where the jets are flying. Schools use computers to keep track of your work. Businesses use computers so they can do more work faster. Without computers we'd all be in a big mess.

WHAT ARE COMPUTERS?

A computer is a tool that helps us to do things better and faster. They work without getting tired. They operate at very high speed. They follow instructions perfectly. And they never forget, like we sometimes do.

The electronic computer has been around now since the late 1940's. The first ones were huge electronic mazes of wires and tubes. They were so expensive so that only big businesses and governments could afford to buy them and keep them running. The early computers required large amounts of electrical energy to run them and generated vast quantities of heat. More importantly they required a specialized team of experts called programmers to tell them what to do.

This is a far cry from how we see a computer nowadays. We see them mostly as watches, calculators, microwave ovens, VCR's, phones, TV's, CD's, and personal computer workstations. This is a little different from the computers used in businesses which are larger and require more space to operate.

People today generally work with a very small version of a computer called a microcomputer. A microcomputer is a computing device where the central processor and memory (RAM) are contained on a very small integrated circuit "chip" called a microprocessor. The central processor is the device that performs arithmetic and makes decisions. The memory is where information in the form of numbers and letters are stored. A microcomputer therefore contains both a microprocessor and some ways to communicate with a person.

All microcomputers have a keyboard for you to type in your instructions. This is called "input". Some have individual keyboards, like a typewriter; others have plastic membranes, like microwave ovens.

All microcomputers have a device which is used to communicate back to a person. This is called "output". some microcomputers use your TV set, while others require a special type of display called a "monitor". Some use paper in a device called a "printer" and some use a liquid crystal display (LCD) which is the same display that is used on some time pieces.

WHAT IS BASIC?

BASIC is a computer language. The name BASIC stands for Beginner's All-purpose Symbolic Instruction Code. It was developed by professors at Dartmouth College in the mid-1960s. It was designed for students who had no previous experience in programming computers.

BASIC is basic; however there are differences in the language based on the computer that uses it in much the same way that English is different depending on which country it is spoken in (Great Britain or the United States) or which part of the country the language is spoken in (East Coast, Midwest, South or "fer sure" the West Coast).

The differences in the language will depend on the computer that is being used and on the computer that produced the language for the computer manufacturer. Microsoft BASIC, so-called because it was developed by the Microsoft Corporation of Belleview, Washington, is found on Apple II+, IBM PC and PC jr., Laser Computers, Commodore VIC20 and Commodore 64 and others. Other computers such as the Timex Sinclair ZX80 and the Texas Instruments 99/4 use versions of BASIC similar to MS-BASIC.

WHAT IS A PROGRAM?

A computer program is a series of instructions that tells a computer what tasks you want it to perform. Computer programs are written in a programming language. BASIC is one of the languages that a human and a computer understand and so BASIC can be used to write a program that a computer can carry out for you.

WHY SHOULD I LEARN TO USE A COMPUTER?

The future belongs to the people who understand how to use computers. Computers can do many things if they are given instructions. For a particular job to be done, by a person or a machine, we must specify the steps which must be done to do the job. The computer becomes an extension of our capabilities. To do this requires us to learn how to talk to our computer.
This book will help you to get started. All you need is your **PRECOMPUTER 2000** and some time.

WHAT IS THIS BOOK FOR?

The **PRECOMPUTER 2000** manual is a step-by-step guide for understanding programs and learning to use the computer language called BASIC. Not everyone wants to write your own programs that are similar to the ones in this book.

WHO'S THIS BOOK FOR?

This guide is written for students and adults who haven't used a computer before. With a little time and effort you will discover that there is nothing difficult about learning to talk to a computer.

WHAT IF I MAKE A MISTAKE?

Don't worry about making a mistake. The more mistakes you make the more you will learn. This is called discovery! The computer doesn't care how many mistakes you make. There is nothing you can do to damage the computer – except smashing it. Experimenting is a very good way to make your programs do exactly what you want.

THE KEYBOARD

1. The numeric (top row) keys are used for entering numbers. The letter keys are used for entering letters.

2. The cursor is a special symbol on the display that indicates where the next character that is pressed on the keyboard will be entered in the computer. The character used on the **PRECOMPUTER 2000** is the blinking block symbol, " ▮ ".

3. The **SHIFT** key is used with another key to enter a character into the computer. For example to enter the "+" character, you must press **SHIFT** and the key marked "+ =". If you just press the "+ =" key then the "=" character will be entered.

4. The **LEFT-ARROW** key and the **RIGHT-ARROW** key are used to position the cursor left or right, respectively. They do not erase any character that is displayed, but you can type over anything in their positions.

5. To enter a space, simply press the SPACE bar. Each time you press the SPACE bar, one space is inserted on the display line.

6. The **INS** and **DEL** keys are used to insert or delete one character at a time on the display where the cursor is positioned. The **INS** key shifts all characters on the display one character to the right to make room for the new character. You can then type in the character in the space provided. Be sure to press the **INS** key and the character for each time you want to insert.

   The **DEL** key is used to delete one character at a time on the display where the cursor is positioned. The **DEL** key will shift all characters on the display one position to the left. thereby erasing the character under the cursor.

7. Before anything on the display is sent to the **PRECOMPUTER 2000**, you must press the **ENTER** key. This key acts much like a Return key on a typewriter. You press all the keys that comprise a statement to the **PRECOMPUTER 2000** and then press **ENTER**. **PRECOMPUTER 2000** will take it from there.

8. Every time BASIC is selected, it is in the overwrite mode. That is, the character you type will appear on the LCD no matter whether there is a character at the cursor position or not.

   When the **INS** key is pressed once, it will be in insert mode. All characters to the right of the cursor position will be shifted one character to the right to make room for the new character once it is input through the keyboard. Pressing the **INS** key again will go to the overwrite mode again.

9. For BASIC only .....
   In BASIC, the "^" character (**BREAK ^** key) is used to tell the computer you want to raise the number preceding it to a power of the number following it. More on arithmetic later.

   The **BREAK ^** key is used as a BREAK which means it can do one of two things. When you are typing a line, but before you press **ENTER**, it will erase all that you have typed; or, if you are running a BASIC program, you can interrupt it by pressing this key. You can restart a program by typing CONT and pressing the **ENTER** key.

   When using the INPUT command, the **PRECOMPUTER 2000** will ask you to supply it with some data from the keyboard. The **PRECOMPUTER 2000** tells you it needs input with a prompt. The prompt is the "?" symbol and it appears on the display indicating that the computer is waiting for you to type something. The letters and numbers that you press appear on the display.

THE DISPLAY

The **PRECOMPUTER 2000** uses a Liquid Crystal Display (LCD). It is 80 characters wide but you can only see 20 characters at a time. The left arrow and right arrow are used to scroll the 20 character display window left or right, respectively.

In BASIC, you will need to press the **ENTER** key to see the next printed statement that your program is displaying. You need to do this so that the output doesn't scroll off the end of the line.

GETTING STARTED

The activity lets you type in your own programs and run them. Follow these simple steps:

1) Turn on the **PRECOMPUTER 2000**
2) Press the **BASIC** key

There are two modes available; Command and Run.

Type in this program:

10 PRINT "HI THERE" *press the **ENTER** key*

This is the usual way to write a program. Type in the program lines and remember to press the **ENTER** key. Each line starts with a number and is followed by a statement. The **PRECOMPUTER 2000** stores the line with the other lines into memory. Later you execute the program by typing the command, RUN. Don't forget to press the **ENTER** key after typing RUN. The program that you have typed into memory will begin. The results appearing on the LCD display will be the message: HI THERE.

There is a short cut.

Enter the following (no line number in front):

PRINT "HI THERE"

This time PRINT was used as a command and the results appeared immediately on the display after **ENTER** key is pressed. The computer executes the command right away, without waiting for you to type RUN. When you do this, the statements are not saved for future re-use. They are executed immediately and discarded. This is not recommended for creating programs but highly recommended for use as a calculator.

Here are some other commands that can be used

NEW

This command clears the memory of any BASIC statements that have been previously entered.

LIST

This command displays each line of your program starting with the lowest line number. Each time you press **ENTER**, the next lines are displayed. You can stop this by pressing the **SHIFT** and **BREAK** keys. If you enter the command with a line number after the word like this, LIST 50, the **PRECOMPUTER 2000** will list the statement at line 50.

RUN

This command instructs **PRECOMPUTER 2000** to begin executing each BASIC statement with a line number that was typed into memory. The computer will start with the lowest line number and proceed up to the highest numbered statement.

EDIT

Use the EDIT command when you want to change a statement that has been typed into memory without re-typing the entire line. Just type EDIT and the line number and press the **ENTER** key. The statement will appear in the display. Use the **LEFT-ARROW** and **RIGHT-ARROW** keys to move the cursor. Use the **DEL** key to remove an unwanted one, or type in a new character.

You can type in line numbered BASIC statements in any order. The **PRECOMPUTER 2000** will sort them out for you and LIST them or RUN starting with the lowest numbered one to the highest numbered one. It is a good idea to number your lines in increments of 10 (10, 20, 30...) or 100 (100, 200, 300...). This way you have room to add more statements if you decide to change your program in the future.

You can insert an entirely new line in a program by using a line number that doesn't exist between two existing ones. You can delete an existing line-numbered statement by merely typing the line number and pressing the **ENTER** key. Of course, you can change an existing line by merely retyping the entire line.

CONT

This command causes the program to resume executing after encountering the BASIC command called STOP. The program will be carried on with the next statement after STOP. You can type CONT to resume the program after you hit the **SHIFT** and **BREAK** keys.

BASIC COMPUTER TUTORIAL

1. A REAL SMALL PROGRAM.

You and Taraesa went to the local video store to rent some movies. Taraesa brought back 12 but 4 were too gory for you and so you took them back. On that trip you carried away and came home with 7 new ones. How many are you going to watch this afternoon? You could work this out yourself but here is a small BASIC program that can do the arithmetic for you.

Type in:

```
10  PRINT  12-4+7          and press ENTER
20  END                    and press ENTER
```

Not much to it. Now type RUN and press **ENTER**. What happens? The answer, 15, appears on the display.

In BASIC, you write a series of line-numbered statements that tell the **PRECOMPUTER 2000** what to do. The first statement, numbered 10, tells the computer to work out the sum of three numbers and then PRINT the answer in the display. The next statement, number 20 tells the computer that this is the end of the program and that it can stop RUNNING. However, the last statement is not necessary in this program because you only want to print out the sum of 3 numbers, therefore, it could be removed.

Remove that last line by typing 20 and press **ENTER**, then type RUN and press **ENTER**. What happens? That's right, you get the same results.

Suppose you typed:

```
10 PRONG 12-4+7                and press ENTER
```

Now type RUN and press **ENTER**, what happens? You get a strange message, "? SYNTAX ERROR IN 10" in the display. That means you made a mistake in BASIC grammar and this is **PRECOMPUTER 2000**'s way of telling you this. You need to EDIT the line or re-type it, changing the "PRONG" word to "PRINT" and then RUN the program to get the correct answer.

You can use **PRECOMPUTER 2000** as a calculator in arithmetic statements like the one above by not using a line number.

Just type:

```
PRINT 12-4+7                   and press ENTER
```

The answer will appear on the display.

Another short cut. You can use the "?" symbol to stand for the word "PRINT". When you are using BASIC as a calculator in "command mode", think of the question mark as meaning "What is 12-4+7"? When you are using the question mark as a "PRINT" command in a program, the computer will replace the "?" with the word "PRINT" for you.

2. LET'S DO SOME ARITHMETIC.

In the previous section you did a sum of three numbers. The numbers like 1, 3, 27, 14.3, etc., are called CONSTANTS. The program added and subtracted the constants 12, 4 and 7. The order that you do addition is unimportant: 6+10 is the same as 10+6. In subtraction, the order is important: 10-6 is not the same as 6-10. So the order that you write numbers and do arithmetic operations is important. In BASIC, operations are from left to right.

The * symbol is used to represent multiplication. Like addition, the order of the numbers is unimportant. Here's an example. There are 2.204 pounds to a kilogram. How many pounds does a 6 kilogram parakeet weigh?

Try this:

```
10 PRINT 6*2.204
```

The symbol / is used for division. Here, like in subtraction, the order of the numbers is important since 15/3 is 5 and 3/15 is .2. How many kilograms does a 6 pound parakeet weigh?

Try this:

```
10 PRINT 6/2.204
```

You can raise a number to a power. To do this you need the ^ sign. The expression 5^3 means 5*5*5 or 125; similarly, 3^5 means 3*3*3*3*3 or 243. There are fractional powers; for example 2^.5 is the square root of 2 or 1.414.... Here's an example: I bet you 1 doubloon and throw the dice 10 times; each time you double your money. How much have you won?

Type:

```
10 PRINT 2^10
```

Now type:

```
20 LET B=10                    press ENTER
```

The computer makes a box called "B" and places 10 into it.

Type:

```
30 LET B=15                    press ENTER
```

The computer tries to make a box called "B", but it already has one called "B" which has a value of 10 in it. No matter, it puts the number 15 into it. The number 10 has been replaced by the number 15.

Now type:

```
40 LET C=A+B                   press ENTER
```

This statement is a bit more complicated. Here's how it works. First, the computer searches for a memory box called "B" and finds in it the number 15. The "+" sign tells the computer to add the numbers found in "A" and "B" together. It does that and the answer is 23. Now, where to put the answer? No problem. The "=" tells the computer to store the answer in a memory box called "C". The computer searches for a box called "C". It doesn't find one so it makes one in memory and then puts the answer into it.

Of course, if there was a memory variable called "C" that had a number in it from a previous operation, the old number would be replaced by the new one by this statement.

Now let's finish this by typing:

```
50 PRINT "FIRST NUMBER"; A

60 PRINT "SECOND NUMBER"; B

70 PRINT "THE SUM IS"; C

RUN
```

You will see the following on the display:

```
FIRST NUMBER 8
SECOND NUMBER 15
THE SUM IS 23
```

(Don't forget to press **ENTER** after you have seen each line to get the next one displayed.)

Let's take a look at the print statements on lines 50 through 70. The words in quotes are called a STRING or a LITERAL. Whatever you put between a set of quotation marks will appear on the display exactly the way you typed them. Don't forget that quotation marks come in pairs!

Next, the semicolon tells the print statement to print the next thing immediately to the right of the end of the string. This is the number 8 which is the value in memory box A.

Suppose that you asked the computer to multiply 9 million times 9 million.

Let's try. Type:

```
10 PRINT 9000000*9000000

RUN
```

The answer on the display is 8.1E+13. This is the computer's way of showing extremely large numbers; a number with 13 zeros to the right of the decimal point. This is called scientific or exponential notation. You find the decimal point and move the number of places specified after the "E" to the right filling in with zeros. The long way to write out the above answer is 81,000,000,000,000. The procedure works in reverse for very small numbers. The number 8.1E-13 is .00000000000081. This is a very small positive number. The number -8.1E+13 is a very large negative number while the number -8.1E-13 is a very small negative number.

4. STRING VARIABLES.

String variables are similar to the numeric variables that we have been working with so far except that the variables contain alphabetic characters (numbers and letters and symbols). The name of the memory variable always contains a $ to distinguish it as a string variable. String variables are not used in arithmetic but allow you to store things like your pet bird's name. Here are some examples:

VARIABLE NAMES	CONTENTS
A	675
B	2.3434
C$	CURTIS
A$	ALPHABET SOUP

You can store a string variable like this:

```
10 LET A$="ALPHABET SOUP NO 123"
```

You can have a numeric variable called A and a string variable called A$. The $ lets BASIC know how to tell them apart.

NOTE: For both numeric and string variables, only the first 2 characters of the variable names are valid. Also, they cannot resemble the name of any command.

Examples: TOTAL is interpreted as the TO command and POTATO is also interpreted as variable PO.

5. CONSTANTS.

A constant is something that doesn't change. The computer stores it in memory just like a variable; however, since a constant doesn't change it has no variable name. The number 6 is a constant; so is 4.567 or 28967.35. "QUICK BROWN FOX" is a string constant.

You can store constants to a variable. That's usually done to start out a program; later the contents of the variables change. Let's see. Suppose we want to count to 10.

Type in this program:

```
New

10 N=0

20 N=N+1

30 PRINT N

40 IF N<10 THEN 20

50 PRINT "THE ANSWER IS"; N

RUN
```

The statement at line 10 stores the numeric constant zero into N, a numeric variable. In statement 20 the variable will have a numeric constant, 1, added to itself and then the sum of that operation will be stored in place of the value previously stored there.

The program in the above example contains a programming construction called a loop. A loop is one or more BASIC statements, usually called a set, that can be executed as many times as you want. The statement in line 40 contains an IF statement. It is called a conditional statement and will be discussed in detail under the topic called Making Decisions.

6. INPUTTING DATA

We have been putting information in the computer by typing constants into programs using statements like the following:

```
10 LET N=10

20 LET A4$="NANCY LIKES CHOCOLATE CUPCAKES"
```

Another way to supply data is by using an INPUT statement.

Try this out by typing:

```
NEW

10 INPUT "GIVE ME A NUMBER"; N

20 PRINT "YOUR NUMBER IS"; N
```

The computer will print the literal following the INPUT command in line 10 on the display. It will prompt you for a number with the character. You can type any number of digits that you like and press **ENTER** to let the computer know you have finished. Ready? Try it, type: RUN and press **ENTER**.

You can also input alphabetic data into string variables like this program:

```
10 INPUT "WHAT IS YOUR NAME"; N$

20 PRINT "HI THERE "; N$
```

Here's another one.

Type:

```
NEW

10 INPUT "GIVE ME A NUMBER";A

20 INPUT "AND ANOTHER";B

30 PRINT "ADD, SUBTRACT, MULTIPLY OR DIVIDE"

40 PRINT "TYPE IN THE FIRST LETTER OF THE"

50 PRINT "ARITHMETIC OPERATION YOU WANT"

60 PRINT "ME TO DO FOR YOU"

70 INPUT R$

100 IF R$="A" THEN C=A+B : GOTO 200

110 IF R$="S" THEN C=A-B : GOTO 200

120 IF R$="M" THEN C=A*B : GOTO 200

130 IF R$="D" THEN C=A/B : GOTO 200

140 PRINT "YOU MADE A MISTAKE"

150 PRINT "TRY AGAIN"

160 GOTO 30

200 PRINT "THE ANSWER IS";C

300 END
```

This is a long program but it has a lot of new things in it that are worthwhile to know about. Line 70 contains an INPUT statement without the prompt string. Lines 100 through 130 contain two statements for the thing to do when the condition is true. One is a LET statement without the word LET (C=A+B) and the other is a GOTO statement. Both of the statements are separated from each other by the colon (: symbol). The GOTO statement tells the computer the number of the next statement to do. Line 140 is an error trap. It tells you that you have not followed instructions.

You can experiment some more with this program and put in a decision to start the program all over again.

What happens if you change line 300 to be GOTO 10? Yes, you are right. The program continues forever. You can stop it by pressing the **SHIFT** and **BREAK** keys and resume it by typing in CONT and press **ENTER**.

8. LOOPING

A loop is a set of one or more instructions. These instructions can be repeated as many times as you want. You can create a loop with a GOTO statement.

A program like the following will run forever:

```
10 INPUT "GIVE ME A NUMBER";N

20 PRINT "YOUR NUMBER IS";N

30 GOTO 10
```

You can modify the program to get out of a loop by using an IF statement to control the loop like the program that calculates the area of a rectangle.

Another way to create a loop is through the use of the FOR and NEXT statements. These statements surround the instructions that you want to repeat.

For example, type the following:

```
NEW

10 FOR N=1 TO 10

20 PRINT "HELLO"

30 NEXT N

RUN
```

How many times does the word HELLO get printed? You can change line 20 to print the value of N every time the loop repeats.

Type:

```
20 PRINT "N IS";N
```

We could always rewrite the program like this:

```
10 N=1

20 PRINT "N IS";N

30 N=N+1

40 IF N > 10 THEN END

50 GOTO 20
```

Are they the same? We can also count by 2's. Let's bring back the previous program and change line 10.

The entire program looks like this:

```
NEW

10 FOR N=1 TO 10 STEP 2

20 PRINT "N IS";N

30 NEXT N

RUN
```

The STEP 2 part changes the meaning hidden in the NEXT N statement to be N = N + 2 or any other number that gets put in the STEP part.

We can even count backwards.

Try this:

```
NEW

10 FOR N=10 TO 1 STEP -1

20 PRINT N

30 NEXT N

40 PRINT "BLAST OFF"

RUN
```

9. MORE ABOUT GROUPS - GOSUB ... RETURN

How much is 10 degrees Celsius in Fahrenheit? What is 100 degrees Fahrenheit in Celsius? Here's a program that gives you the answers. It uses the GOSUB and RETURN statements to create a group of instructions that can be executed from various parts of the program. Remember when you use a GOSUB, the program branches to the line number that you specify in the statements that will be executed sequentially until a RETURN statement is encountered. At that point the program will resume at the next statement following the GOSUB. Confusing? Not really, but first some more background about our problem.

The formula for converting Celsius to Fahrenheit is:

F=(9/5*C)+32

The formula for Fahrenheit to Celsius is:

C=(F-32)*5/9

Now for the program!

Type:

```
New

10 INPUT "ENTER THE CELSIUS TEMP";C

20 GOSUB 500

30 INPUT "ENTER THE FAHRENHEIT TEMP";F

40 GOSUB 600

50 END

500 F=(C*9/5)+32

510 PRINT "THE FAHRENHEIT TEMP IS";F

520 RETURN

600 C=(F-32)*5/9

610 PRINT "THE CELSIUS TEMP IS";C

630 RETURN
```

REFERENCE SECTION

The REFERENCE SECTION contains a brief explanation of all the commands and statements you will use in this manual. Refer to this when you need help.

CLEAR

The CLEAR statement is used to assign more memory space for the string variables.

Example:

```
10 Clear 100
```

This command will assign 100 bytes of memory for strings. If the CLEAR command is not used, the computer will assume the number of bytes of memory for strings to be 50. The use of the CLEAR command only, will reserve the same number of bytes as the default value. However, if a value follows the CLEAR command, the computer will assign the number of bytes of that value. If you want to use more strings in your program, set this number to a larger one but, at the same time, you will have less space for your program.

CONT

Also see STOP

This command causes the program to resume executing after encountering the BASIC command called STOP. The program will carry on with the next statement after STOP. You can type CONT to resume the program after you hit the **SHIFT** and **BREAK** keys.

DIM

Line # DIM array-name (array-size).

The DIM command reserves space for one dimensional numeric or string arrays. The array-name may be up to 6 characters long, only the first 2 characters are valid. For a string array the last character must be a $. The array can contain up to 100 elements (0-99).

Example:

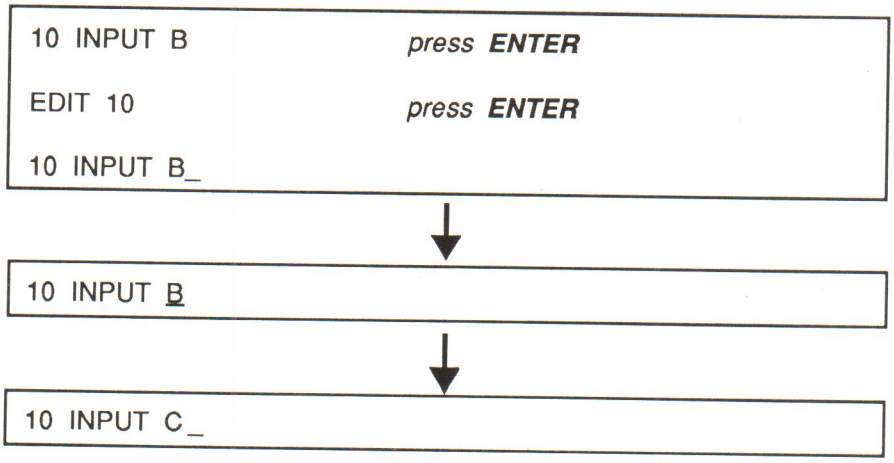
```
10 DIM FRIEND$(50)
```

```
10 DIM PRICE(19)
```

EDIT

Use the EDIT command when you want to change a statement that has been typed into memory without re-typing the entire line. Just type EDIT and line number and press the **ENTER** key. The statement will appear on the display. Use the **LEFT-ARROW** and **RIGHT-ARROW** keys to move the cursor. Use the **DEL** key to remove an unwanted character, or simply type in new characters.

Example:



You can type in line-numbered BASIC statements in any order. The **PRECOMPUTER 2000** will sort them out for you and LIST them or RUN them starting with the lowest numbered one. It is a good idea to number your lines in increments of 10 (10, 20, 30...) or 100 (100, 200, 300...). This way you have room to add more statements if you decide to change your program in the future.

You can insert an entirely new line in a program by using a line number that doesn't exist between two existing ones. You can delete an existing line-numbered statement by merely typing the line number and pressing the **ENTER** key. Of course, you can change an existing line by merely retyping the entire line.

END

Line # END

The END statement is used as the last command in a program. It stops the program.

Examples:

```
160 END
```

```
999 END
```

FOR ... TO ... STEP ... NEXT

Line# **FOR** variable=initial value **TO** final value **STEP** stepsize (optional)
Line#
Line#
Line#
Line# **NEXT** variable

The FOR ... NEXT statement repeats a task a set number of times without having to rewrite it. All statements between the FOR and NEXT command are repeated based on the initial value, the final value and the stepsize. If the STEP portion of the command is not used it is assumed to be 1.

Example:

```
60 FOR ITEMS=1 TO 20

70 INPUT PRICE

80 SUM=PRICE+SUM

90 NEXT ITEMS
```

FUNCTION

A function is a mathematical procedure which when applied to a certain value will give a new value. We call the value in brackets (), the argument and the new value the result.

Example: SQR is the square root function. So if we type PRINT SQR (9) (press **ENTER**) we will get the answer 3.

Example:

```
Y=9 : X=SQR(Y) : PRINT X                    press ENTER
```

We will get the answer 3.

In these two examples 9 is the argument, SQR is the function and 3 the result.

A LIST OF NUMERIC FUNCTIONS

Function	
ABS (X)	Returns the absolute (positive)Value of X
SGN (X)	Returns the sign of the argument X negative returns - 1 X positive returns + 1 X zero returns 0
SQR (X)	Returns the square root of X. X cannot be negative.
LOG (X)	Gives the natural logarithm of X, i.e., the logarithm to the base e (=2.71828). The value of the argument must be greater than zero.
EXP (X)	Gives you the value e - i.e., the natural antilogarithm of X.
INT (X)	Gives the greatest integer which is less than or equal to X.
RND (X)	Gives a random whole number between 1 and X. If X equals zero, RND (X) returns a random number between 0 and 1. X cannot be negative.
SIN (X) **COS (X)** **TAN (X)**	The argument of the trigonometrical functions is taken to be in radians (1 radian=360/2π = 57.296 degrees). The range of X is -999 < (X) < 999.
ATN (X)	This gives the result of ARC TANGENT in radians.

ARITHMETIC FUNCTIONS

ABS (X)

This gives the absolute (positive) value of the argument. So ABS (-7) =7.

Example:

```
PRINT ABS (7-2*4)                    press ENTER

1
```

SGN (X)

This function will give the value of +1 if X is positive, 0 if X is zero, and -1 if X is negative. So SGN(4.3)=1; SGN(0)=0; SGN(-276)=1

Example:

```
A=6                                    press ENTER

PRINT SGN (A); SGN (A-A)               press ENTER

1    0
```

INT (X)

This converts arguments which are not whole into the largest whole number below the argument. So INT (5.9)=5;also INT (-5.9)=-6. Note that with negative arguments, the absolute value of the result returned by INT will be greater than that of the argument.

Example:

```
PRINT INT (-6.7)                       press ENTER

-7
```

RND (X)

This will produce a random number between 1 and X if X is positive.

Example:

```
PRINT RND (19)                         press ENTER
```

You will get number between 1 and 19. RND (0) will give you a number between 0 and 1.

Note: X cannot negative.

STRING FUNCTIONS

We can also use functions to act on strings. Have a look at the following:

Note: From now on, the **ENTER** key sign will be deleted for simplicity. Remember to press the **ENTER** key after each line of entry.

LEN

This function computes the length of the string argument, which must be in brackets. So if you type PRINT LEN ("JOHN") the computer will return the result 4. This is telling you that there are 4 characters in the string "JOHN". Blank spaces have the value of characters. Thus if you put in spaces "J O H N", it comes out as 7 characters.

STR$

The STR$ function changes a number argument into a string. Let us take a look at the following example and see how it works.

Example:

```
A$=STR$(73)
```

This is the same as saying A$="73".

Here is sample program

Example:

```
10 A$=STR$(7*3)
20 B$=A$+"BIG"
30 PRINT B$
RUN
21BIG
```

VAL

VAL works like STR$ but in reverse. It changes a string argument into a number. Look at the following short program.

Example:

```
10 A$="33"
20 B$="20"
30 C=VAL(A$+B$)
40 PRINT C;C+100
RUN
3320  3420
```

MID$ (A$,M,N)

This function return a substring of the string A$ starting from the Mth character with a length of Nth characters.

Example:

```
10 A$="ABCDEFGH"

20 B$=MID$(A$,2,3)

30 PRINT B$

RUN

BCD
```

ASC(A$)

The ASC statement will return the ASCII code (in decimal) for the FIRST character of the specified string. Brackets must enclose the string specified. Refer to the appendix for the ASCII code table (Pg.56). For example the ASCII decimal value of "X" is 88. If A$="XAB", then ASC (A$)=88.

Example:

```
10 X=ASC("ROY")

20 PRINT X

RUN

82
```

CHR$ (N)

This statement works the opposite way as the ASC statement. The CHR$ statement will return the string character which corresponds to the given ASCII code. The argument may be any number from 32 to 127 or any variable expression with an integer value within that range. Brackets must be put around the argument.

Example:

```
30 PRINT CHR$(68)

RUN

D
```

GOSUB...RETURN

Line# **GOSUB** first line number of subroutine.
Line#
Line#
Line#
Line# first line number of subroutine
Line#
Line# **RETURN**

The GOSUB command tells the computer to GOTO another line number. After the process has been completed, a RETURN statement is used to send the computer back to the line immediately after the GOSUB. These statements are used to process a series of commands that are frequently used.

Example:

```
30 GOSUB 120

.

.

other program lines

.

.

120 PRINT "WELCOME TO THE"

130 PRINT "PRECOMPUTER 2000"

140 RETURN
```

GOTO

Line # **GOTO** line number

The GOTO statement is used to change the normal flow of the program (which is from lowest statement number to highest). A GOTO command transfers control to the specified line.

Examples:

```
10 GOTO 130
```

```
200 GOTO 65
```

IF...THEN...ELSE

In general terms, the IF...THEN... statement is used for CONDITIONAL BRANCHING. It uses the general form "IF (condition) THEN (action clause)". A condition is made up of an expression, a relation and an expression.

Any BASIC expression, either numeric or string, may be used, but both expressions must be the same type.

Relations or comparisons used in the IF...THEN statement are the following:

= Equal to
< = Less than or equal to
< > Not equal to
> = Greater than or equal to
< Less than
> Greater than

Examples of how you can use conditionals:

IF....THEN A=B
IF....THEN GOTO
IF....THEN GOSUB
IF....THEN PRINT
IF....THEN INPUT

Example:

```
30 IF X >25 THEN 60
```

Here if the condition X >25 is true, the computer is told to jump to line 60 (Note:the GOTO is optional after THEN).

If the condition is not true, that is, if X is not greater than 25 then the computer simply carries on with the normal line number order in the program. Notice that it is not necessary to use the ELSE part of the command here as this is optional.

Example:

```
10 INPUT A,B

20 IF A > B THEN 50

30 IF A < B THEN 60

40 IF A = B THEN 70

50 PRINT A; "IS GREATER THAN"; B:END

60 PRINT A; "IS LESS THAN"; B: END

70 PRINT A; "IS EQUAL TO";B

80 END

RUN

? 7

?? 3

7 IS GREATER THAN 3
```

Example:

```
40 IF P=6 THEN PRINT "TRUE" ELSE PRINT "FALSE"
```

In this example if P=6 the computer will print TRUE. Any other value will produce a FALSE. In either case the computer will carry onto the next line.

It is possible for more than one statement to follow the THEN or ELSE command, a colon separates the statements.

Example:

```
50 IF A =5 THEN PRINT "TRUE": S=S-3:
GOTO 90 ELSE PRINT "FALSE": K=K+8
```

So if A equals 5 the computer will print TRUE, subtract 3 from the variable S and go to line 90. If A does not equal 5 the computer will print FALSE, add 8 to the variable K and then carry on with the next normal line.

TRUTH TABLE FOR "OR" FUNCTION		
A	**B**	**A OR B**
T	T	T
T	F	T
F	T	T
F	F	F

Note that T = TRUE and F = FALSE.

Example:

```
10 INPUT A,B,C
20 IF A=B AND B=C THEN PRINT "A=B=C"
30 IF (NOT A=B) OR (NOT B=C) THEN 50
40 END
50 PRINT "A=B=C IS FALSE"
60 END
RUN
? 10
?? 5
?? 7
A=B=C IS FALSE
```

Moreover AND, OR, NOT can be used to manipulate numerical values. These operations are based on binary numbers with 1 and 0 representing TRUE and FALSE respectively.

For example:

i) NOT 1=-2 [1=binary 00000001 and -2=binary 11111110, so it just changes the 1 to 0 and 0 to 1. In other words, TRUE(1) changed to FALSE(0) and FALSE(0) is changed to TRUE(1).]

ii) 6 OR 13=15 [6=binary 00000110 and 13=binary 00001101, so, with reference to the OR truth table, 6 OR 13 =15=binary 00001111]

iii) 6 AND 13=4 [6=binary 00000110 and 13=binary 00001101, so with reference to the AND truth table, 6 AND 13=4 binary 00000100]

INPUT

Line # **INPUT** "(optional character string)"; variable 1, variable 2,....

INPUT allows the user to type in the value of a variable at the time the program is RUN. If an optional character string is used, this message will be printed before the question is asked. The type of data to be INPUTTED varies according to the type of the variable.

Examples:

```
35 INPUT AMOUNT
```

```
140 INPUT "WHAT IS YOUR NAME:";NAME$
```

LET

Line # **LET** variable = variable expression

The variable expression is calculated and the result is stored under the variable. The word LET is optional.

Examples:

```
40 LET SUM=A+B+C
```

```
25 LET COST=PRICE-PROFIT
```

LIST

LIST (optional line number)

LIST is used to display the active program. If the optional line number is omitted, the first line of the program will be displayed. If the line is longer than 20 characters, you must use —> to move to the right. To continue the LISTING press the **ENTER** key. To discontinue the LISTING press **SHIFT** and **BREAK** keys.

Examples:

```
LIST
```

```
LIST 50
```

NEW

NEW erases all program lines from the active program area.

PRINT

Line # **PRINT** expression and/or character string

The PRINT statement is used to produce output on the display panel. The PRINT command will print one or several items – either expressions or strings. Each item in the list should be separated by a comma or a semicolon.

Example:

```
80 PRINT NAME$; "IS COMING"

230 PRINT "SUM="; A+B+C
```

READ AND DATA

When it is necessary to enter a lot of information or data into the computer, using the INPUT statement can be very time consuming. To help out use the READ and DATA commands.

Example:

```
10 DATA 10,60,70,80,90

20 READ A,B,C,D,E

30 PRINT A;B;C;D;E

RUN

10 60 70 80 90
```

The READ statement consists of a list of variable names with commas between each variable.

The DATA statement consists of a list of expressions separated by commas. These expressions can be either numeric or strings. The READ statement makes the computer look up the value of its variables from the DATA statement. When the computer goes to READ first it will assign the first expression from the DATA list. The next time it goes to READ it will assign the second value-And so on. If the READ runs out of DATA you will get '? OUT OF DATA ERROR.'

RESTORE

If you want to use the same data later on in the program you can do so by using the RESTORE statement.

Example:

```
10 DATA 1,3,8,9

20 READ A,B,D

30 RESTORE

40 READ X,Y

50 PRINT A;B

60 PRINT X;Y

70 END

RUN

1  3

1  3
```

The RESTORE command makes subsequent READ statements get their values from the start of the first DATA statement.

Now see if you can work out what is happening here.

Example:

```
10 REM FIND AVERAGE

20 DATA 0.125,3,0.6,7

30 DATA 23,9.3,25.2,8

40 S=0

50 FOR I=1 TO 8

60 READ N

70 S=S+N

80 NEXT

90 A=S/8

100 PRINT A

RUN

9.52813
```

REM

Line # **REM** text

REM is used to add comments in your program which are ignored when the program is RUN.

Example:

```
10 REM**GUESSING GAME**

20 REM TEST OF SORTING
```

RUN

RUN tells the computer to begin to perform your program beginning with the lowest statement number.

STOP ... CONT

Line # **STOP**
CONT

The STOP command halts the RUNNING of a program at that line. This is helpful for debugging. To CONTINUE at the next line after the STOP command, type CONT directly without a line number.

Example:

```
800 STOP
```

APPENDIX

EXAMPLE PROGRAMS

1 COMPUTER FRIEND

```
10 PRINT "I AM PC2000 COMPUTER"
20 INPUT "WHAT IS YOUR NAME";N$
30 PRINT "HELLO ";N$
40 PRINT "I COME FROM HONG KONG"
50 PRINT "WHERE DID YOU COME FROM?"
60 PRINT "I HOPE WE BECOME FRIENDS"
70 END
```

2 APPLE PRICE

```
10 INPUT "HOW MANY APPLES WILL YOU BUY";A
20 INPUT "HOW MUCH DOES IT COST";M
30 LET P=M/A
40 PRINT "EACH APPLE PRICE IS";P
50 END
```

3 POUNDS AND KILOGRAMS

```
10 INPUT "POUNDS OR KILOGRAMS";A$
20 IF A$="POUNDS" THEN GOTO 60
30 INPUT "HOW MANY POUNDS";P
40 PRINT P;"POUNDS=";P*.45;"KILOGRAMS"
50 GOTO 80
60 INPUT "HOW MANY KILOGRAMS";K
70 PRINT K;"KILOGRAMS=";K/.45;"POUNDS"
80 END
```

4 LEARN SCHEDULE

```
10 DIM WEEK$(6)
20 DIM EVENT$(6)
30 DATA "SUNDAY","PLAY TIME"
40 DATA "MONDAY","LEARN ECOLOGY"
50 DATA "TUESDAY","LEARN ENGLISH"
60 DATA "WEDNESDAY","LEARN MUSIC"
70 DATA "THURSDAY","LEARN HISTORY"
80 DATA "FRIDAY","LEARN GEOGRAPHY"
90 DATA "SATURDAY","PLAY FOOTBALL"
100 REM *****LIST******
110 FOR W=0 TO 6
120 READ WEEK$(W)
130 READ EVENT$(W)
140 PRINT WEEK$(W),EVENT$(W)
150 NEXT W
999 END
```

5 PHONE BOOKS

```
10 INPUT "FRIEND'S NAME";NAME$
20 A=0
30 IF A=10 THEN 90
40 READ NM$
50 READ PHONE$
60 IF NAME$=NM$ THEN PRINT PHONE$:GOTO 120
70 A=A+1
80 GOTO 30
90 PRINT "NOT LISTED"
100 RESTORE
110 GOTO 10
120 END
130 DATA "FRED","693212"
140 DATA "ROB","613816"
150 DATA "RICK","813313"
160 DATA "JAN","35677"
170 DATA "JON","767654"
180 DATA "JOAN","54367"
190 DATA "THOMAS","93523"
200 DATA "JACK","63457"
210 DATA "DON","84573"
220 DATA "LONDON","65322"
```

6 YOUR FUTURE

```
10 INPUT "HOW OLD ARE YOU";AGE
20 PRINT "WHAT DO YOU WANT"
30 PRINT "TO BE WHEN YOU"
40 INPUT "GROW UP";JOB$
50 PRINT "ARE YOU A"
60 INPUT "BOY OR GIRL";SEX$
70 INPUT "YOUR LAST NAME";NAME$
80 PRINT ABS(21-AGE); "YEARS FROM NOW"
90 IF SEX$="BOY" THEN PRINT "MR. ";NAME$
100 IF SEX$="GIRL" THEN PRINT "MS. ";NAME$
110 PRINT "YOUR JOB IS ";JOB$
120 END
```

7 CASINO

```
10 PRINT "2 TO 6 SMALL"
20 PRINT "7 TO 12 LARGE"
30 INPUT "(SM)ALL OR (LA)RGE";A$
40 D1=INT(RND(0)*6)+1
50 D2=INT(RND(0)*6)+1
60 PRINT D1;" AND ";D2
70 PRINT D1+D2;
80 IF D1+D2>6 THEN GOTO 130
90 PRINT "SMALL"
100 IF A$="SM" THEN PRINT "YOU WIN!"
110 IF A$="LA" THEN PRINT "YOU LOSE!"
120 GOTO 160
130 PRINT "LARGE"
140 IF A$="LA" THEN PRINT "YOU WIN!"
150 IF A$="SM" THEN PRINT "YOU LOSE!"
160 INPUT "AGAIN(YES/NO)";Y$
170 IF Y$="YES" THEN GOTO 30
999 END
```

8 MATH TEST

```
10 PRINT "TYPE THE ANSWER"
20 S=0
30 INPUT "3+4=";ANSWER
40 IF ANSWER=(3+4) THEN S=S+1
50 PRINT "3+4=";3+4
60 INPUT "22+9=";ANSWER
70 IF ANSWER=(22+9) THEN S=S+1
80 PRINT "22+9=";22+9
90 INPUT "9-6=";ANSWER
100 IF ANSWER=(9-6) THEN S=S+1
110 PRINT "9-6=";9-6
120 INPUT "4*5=";ANSWER
130 IF ANSWER=(4*5) THEN S=S+1
140 PRINT "4*5=";4*5
150 INPUT "12/3=";ANSWER
160 IF ANSWER=(12/3) THEN S=S+1
170 PRINT "12/3=";12/3
180 INPUT "8+5*2-6/3=";ANSWER
190 IF ANSWER=(8+5*2-6/3) THEN S=S+1
200 PRINT "8+5*2-6/3=";8+5*2-6/3
210 PRINT S;"RIGHT OUT OF 6"
```

9 BAGELS

```
0 REM GUESSING GAME
1 FOR T=1 TO 5
2 LET L=1
3 LET H=100
4 PRINT "PICKS RANDOM 1-100"
5 REM "4 PICKS RANDOM NUMBER"
6 LET N=INT(RND(0)*(H+1-L)+0.5)+1
7 REM S IS SCORE
8 S=0
50 INPUT "TYPE YOUR GUESS";G
60 S=S+1
70 REM ADD 1 TO SCORE
80 IF G=N THEN GOTO 130
90 IF G<N THEN GOTO 110
95 PRINT "HIGH GUESS"
100  GOTO 50
110 PRINT "LOW GUESS"
120 GOTO 50
130 PRINT "CORRECT!"
140 PRINT "YOU TOOK ";S;"GUESSES"
150 NEXT T
10000 END
```

THE ASCII CODE TABLE

Decimal Value	Printable Character	Decimal Value	Printable Character	Decimal Value	Printable Character
32	(Space)	64	@	96	` (Accent)
33	!	65	A	97	a
34	"	66	B	98	b
35	#	67	C	99	c
36	$	68	D	100	d
37	%	69	E	101	e
38	&	70	F	102	f
39	' (Apostrophe)	71	G	103	g
40	(	72	H	104	h
41	)	73	I	105	i
42	*	74	J	106	j
43	+	75	K	107	k
44	,	76	L	108	l
45	-	77	M	109	m
46	.	78	N	110	n
47	/	79	O	111	o
48	0	80	P	112	p
49	1	81	Q	113	q
50	2	82	R	114	r
51	3	83	S	115	s
52	4	84	T	116	t
53	5	85	U	117	u
54	6	86	V	118	v
55	7	87	W	119	w
56	8	88	X	120	x
57	9	89	Y	121	y
58	:	90	Z	122	z
59	;	91	[	123	{
60	<	92	\	124	|
61	=	93	]	125	}
62	>	94	^	126	~
63	?	95	_ (Under score)	127	Δ

THE ERROR MESSAGES

CANNOT CONTINUE

An attempt is made to continue a program that:

1. has halted due to an error,
2. has been modified during a break in execution, or
3. does not exist.

DIVISION BY ZERO

A division by zero is encountered in an expression, or the operation of involution results in zero being raised to a negative power.

EXTRA IGNORED

More than one parameter is entered to 'INPUT' command.

ILLEGAL DIRECT

A statement that is illegal in direct mode command. Example: INPUT

ILLEGAL FUNCTION CALL

A parameter that is out of range is passed to a math or string function. This error may also occur as the result of:

1. a negative or unreasonably large subscript
2. a negative or zero argument with LOG
3. a negative argument to SQR
4. a negative mantissa with a non-integer exponent
5. an improper argument to MID$, LEFT$, RIGHT$.

MISSING OPERAND

The operand of some commands are missed.

NEXT WITHOUT FOR

A variable in a NEXT statement does not correspond to a previously executed unmatched FOR statement variable.

OUT OF DATA

A READ statement is executed when there are no DATA statements with unread data remaining in the program.

OUT OF MEMORY

A program is too large, had too many FOR loops or GOSUB, too many variables, or expressions that are too complicated.

OUT OF STRING SPACE

String variables have caused BASIC to exceed the amount of free memory remaining.

OVERFLOW

The result of a calculation is too large to be represented in the number format. If underflow occurs, the result is zero and execution continues without an error.

REDIMENSIONED ARRAY

Two DIM statements are given for the same array, or a DIM statement is given for an array after the default dimension of 10 has been established for that array.

REDO

A string is assigned to a numeric variable during the execution of the INPUT command.

RETURN WITHOUT GOSUB

A RETURN statement is encountered for which there is no previous unmatched GOSUB statement.

STRING FORMULA TOO COMPLEX

A string expression is too long or too complex. The expression should be broken into smaller expressions.

STRING TOO LONG

An attempt is made to create a string more than 255 characters long.

SUBSCRIPT OUT OF RANGE

An array element is referenced either with a subscript that is outside the dimensions of the array or with the wrong number of subscripts.

SYNTAX ERROR

A line is encountered that contains some incorrect sequence of characters (such as unmatched parentheses, misspelled command or statement, incorrect punctuation, etc.)

TYPE MISMATCH

A string variable name is assigned a numeric value or vice versa; a function that expects a numeric argument is given a string argument or vice versa.

UNDEFINED STATEMENT

A line reference in a GOTO, GOSUB or IF ... THEN ... ELSE is to a nonexistent line.

CHAPTER 6 Spell Checker

THERE ARE 5 WAYS TO CHECK THE SPELLING OF A WORD.

1. Sound Out A Word

   Type in the word the way that you think it's spelled. Then press the **ENTER** key. If the spelling is correct, the screen will display "CORRECT!". If it is not, the **PRECOMPUTER 2000** will give a list of suggestions. Use the [← PREV] and [→ NEXT] keys to search back and forth in the list until "END OF LIST" appears on the screen. Depending on how close to the correct spelling you are, the actual word you are searching for will be displayed on the screen.

   If "NO WORD FOUND!" appears on the screen, input the word again using a different spelling.

2. USE THE QUESTION MARK KEY [? /]

   Another way to find the correct spelling of a word, is to use the question mark symbol in place of the letters that you are not sure of.

   NOTE: Use this function when you know how many letters are in the word.

   EXAMPLE: If you want to know the spelling of DICTIONARY but you only remember the letters DICT__NA_Y, press the question mark key for the letters you don't know, like DICT??NA?Y, then press **ENTER**. **PRECOMPUTER 2000** will then display DICTIONARY on the screen.

3. USE THE PERIOD KEY [> .]

   Use the PERIOD key to find the correct abbreviations for words.

   EXAMPLE: If you want to learn the proper abbreviation for the word ETCETERA, type in the letters that you think are correct followed by the PERIOD key, and press **ENTER**. If you input "ETA.", computer would begin displaying abbreviations that are close to what you typed, including the correct abbreviation for ETCETERA - "ETC."

   NOTE: Depending on the word that you input, **PRECOMPUTER 2000** will display either one word or a suggested list or words.

4. USE THE APOSTROPHE KEY [" ']

   Use the APOSTROPHE key to find the correct contractions for words.

   EXAMPLE: If you want to know the correct contraction of "ARE NOT", type in the contraction (with the apostrophe) the way you think it should be spelled, and press **ENTER**. If you input "ARE'T", **PRECOMPUTER 2000** would display a list of words including the correct spelling of "AREN'T".

5. USE THE HYPHEN KEY [- / 6]

This key allows you to check the spelling of hyphenated words.

EXAMPLE: If you want to find the correct way to spell "X-RAY", type it in the way you think it should be spelled including the hyphen. If you input "X-RA", **PRECOMPUTER 2000** will display a list of words which include the correct spelling "X-RAY".

CHAPTER 7 Calculator

The CALCULATOR key turns the **PRECOMPUTER 2000** into an operational calculator with a 14 digit memory. Use the numeric keys on the keyboard and the 19 specially marked keys in the second and third row. To clear the screen, use the AC key at the bottom of the keyboard.

BASIC CALCULATOR OPERATION

The basic calculator symbols are:

S / + : Addition or SHIFT + + / =

D / - : Subtraction or SHIFT + - / 6

F / X : Multiplication

G / ÷ : Division

USING THE MEMORY FEATURES:

H / Min : Inputs the number to memory.

J / MR : Recalls the memory. The number saved in memory will be shown on the screen.

K / M+ : Adds the number to memory.

L / M- : Subtracts the number from memory.

Example:

Input	Display
23 + 45 + 78 ENTER ↵ K M+	M = 0 146_
ERASE AC	M = 146 _
34 - 78 ENTER ↵	M = 146 -44_
K M+	M = 102 -44_
ERASE AC	M = 102 _
23 - 6 + 9 ENTER ↵	M = 102 26_
L M-	M = 76 26_

SPECIAL MATHEMATICAL FUNCTIONS

The CALCULATOR has special function keys located on the second and third rows on the input keyboard. Always press the function key first when using them in a problem and then enter the number they are to operate on.

Aim	Operation	Display
Square root of a number.	Q √x 9	sqrt 9
	ENTER ↵	3
Square of a number.	W X² 3	sqr 3
	ENTER ↵	9
The constant e to the power of the entered number. (e=2.718282)	O eˣ 2	exp 2
	ENTER ↵	7.38906
LN function	I LN 100	ln 100
	ENTER ↵	4.60517
log 10 function	P Log 10 100	log 100
	ENTER ↵	2

TRIGONOMETRIC FUNCTIONS

All the trigonometric functions can take two forms of input, radians and degrees. If you just type in a number the CALCULATOR assumes the number is in radians. To enter degrees, press the degree sign which is on the E key of the input keyboard.

Function	Operation	Display
SINE	R SIN 60	sin 60
	ENTER ↵	-0.30481
SINE	R SIN 60 E °	sin 60°
	ENTER ↵	0.866025
COSINE	T COS 60	cos 60
	ENTER ↵	-0.952413
COSINE	T COS 60 E °	cos 60°
	ENTER ↵	0.5
TANGENT	Y TAN 60	tan 60
	ENTER ↵	0.32004
TANGENT	Y TAN 60 E °	tan 60°
	ENTER ↵	1.73205

Function	Operation	Display
ARC TANGENT	U ATN 60	atn 60
	ENTER ↵	1.55413
ARC TANGENT	U ATN 60 E	atn 60°
	ENTER ↵	--E-- (atn 60° produces an error)
π (Constant)	A π	3.14159265358979
This special constant can be entered into any problem by entering this key.		

CHAPTER 8 Cartridge

There is an entire library of optional expansion cartridges available for **PRECOMPUTER 2000**. They contain various other courses of study which help to keep students challenged for years to come. To use a cartridge, follow these steps:

1. Turn the unit off.
2. Insert the cartridge in the cartridge slot on the left side of the **PRECOMPUTER 2000**.
3. Turn the unit on.
4. Press the **CARTRIDGE** key and begin to play.

CHAPTER 9 Care and Maintenance

1. Keep unit free of dust with a damp cloth.
2. Do not spill liquids on the keyboard or main unit.
3. Do not expose the **PRECOMPUTER 2000** to direct sunlight.
4. Do not clean with strong cleansers.
5. Do not leave batteries in for long periods of time when not in use.

NOTICE TO PARENTS:
Would like to draw your attention that any safety isolating transfromer or charging unit to be used with the toy should be regularly examined for potential hazards, such as damage to the cable or code, plug, enclosure or other parts, and that, in the event of such damage, the toy must not be used until that damage has been properly removed.

POWER SUPPLY:

Rating: DC 6V ⎓ 1.5W

batteries: 4 X 1.5V "C"/UM-2/LR14
DO NOT USE RECHARGEABLE BATTERIES

Adaptor: Use VTECH or any adaptor comply with CEE publication 15.
DC 9V ⎓ 300mA
Centre-positive +—●—-